2.1.4 (504K) FI-125

Spawning Gravel Introduction, Tuolumne River, La Grange

I. Executive Summary

Applicant California Department of Fish and Game (DFG)
Region 4
1234 East Shaw Avenue
Fresno, California 93710

Project Description and Primary Biological/Ecological Objectives
The purpose of the project is to begin the restoration of the course sediment supply to the Tuolumne River by introducing clean gravels into the river between La Grange Dam and Old Basso Bridge. Increased and improved chinook salmon spawning habitat can be expected.

Clean, sized river run gravels would be placed into or on the bank of the river at several appropriate sites. The amount and placement of these gravels would be determined by the physical and hydrological conditions specific to each site. The gravel mixture would be sized smaller than the gravel currently existing on the bed surface and appropriate for salmon spawning use. The project assumes gravel movement over time. The gravel would mobilize, deposit as bars and spawning habitat, and redeposit over time. All the gravel placed during the project would be moved downstream by the flow of the Tuolumne River, mimicking the natural process of course sediment transport.

Approach/Tasks/Schedules
The project would be done in 2 phases segregated only because of geography and logistics. Phase 1 would place 10,000 cubic yard of spawning gravel in the river from La Grange Dam downstream to the La Grange Bridge (J59). All work necessary for this phase of the project would be completed in 1998. Monitoring and evaluation of this phase would help guide the continued replenishment of gravel in the Tuolumne River.

Phase 2 would add 10,000 cubic yards of spawning gravel from the La Grange Bridge (J59) downstream to the Basso Bridge (Hwy-132). If appropriate, Phase 2 would also add more gravel to the sites used in Phase 1. Phase 2 would be completed in 1999.

In both Phase 1 and 2, gravel from local sources would be purchased, transported and placed in the addition sites. Gravel addition sites selection would be dependent upon their biological potential to support spawning, geomorphic and hydrological conditions, access and their overall state of implementability.

Justification for Project and Funding by CALFED
Construction of La Grange Dam in 1893 ended coarse sediment supply from the Tuolumne River watershed upstream of the town of La Grange. Since its construction, sediment transported during high flows have come from the bed itself or limited floodplain deposits. Elimination of upstream sediment supply has caused bed particle coarsening in the spawning reach near La Grange. This deterioration of salmon spawning habitat has been

identified in the CALFED process as a primary stressor of salmon and steelhead trout. Gravel supplies are a critical part of salmonid restoration efforts and long-term maintenance of these gravels is necessary. This project would mimic the natural process of coarse sediment supply transport and would help increase and improve degraded spawning habitat in the upper reach of the designated spawning area (Fish and Game Code 1505) heavily used by fall-run chinook salmon.

Budget Costs and Third Party Impacts

The majority of cost would be incurred from purchasing, processing, transporting and placing the necessary gravel. Based on similar projects completed in the recent past, a estimated total cost of $15/cubic yard would be necessary to complete the project. Phase 1 may be done for less because material belonging to the Department of Fish and Game (DFG) is available near the selected gravel addition sites. Funding for both Phase 1 and 2 is being requested; a total of $504,450. Incremental payment is suggested. No third party impacts are expected.

Applicants Qualifications

The DFG Region 4's anadromous fisheries staff have worked closely with the various other state, federal and private personnel, to construct and repair chinook salmon spawning, rearing and predator pond isolation project in the San Joaquin River basin. The DFG has the clerical, fiscal and contractual personnel necessary to support the biological and technical experts administering this project. The DFG have also taken into consideration information and recommendations obtained from the watershed analysis being conducted by the Tuolumne River Technical Advisory Committee (contracted consultants) and other sources to complete this project.

Monitoring and Data Evaluation

Four physical monitoring techniques would be used: cross section surveys, tracer gravels, scour cores, and bedload transport sampling. Cross sections would be placed through the alluvial features created at the introduction sites, and would document changes in morphology (overall gain or loss of gravel storage) at each introduction site. Tracer gravels (painted gravels) would be placed in gravel introduction deposits to document bed mobility thresholds and travel distance during high flow events. Scour cores would be placed in gravel introduction deposits to document the depth of gravel scour and redeposition during high flow events. Bedload transport sampling would be conducted from the Old Basso Bridge (river mile 47.5) to estimate gravel transport as a function of discharge, which would help quantify how much gravel should be introduced yearly.

DFG escapement surveys would continue to provide valuable data to help evaluate the biological impacts of the proposed project. In addition, mapping of redds on the proposed sites would also be conducted to more fully evaluate the biological impacts of the proposed project.

Local Support/Coordination with other Projects/Compatibility with CALFED Objectives

This project is supported by numerous individuals, agencies and the Tuolumne River Technical Advisory Committee.

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II. Title Page

Applicant	California Department of Fish and Game (DFG) Region 4 1234 East Shaw Avenue Fresno, California 93710 Telephone (209) 243 4005 Fax (209) 243 4022
Type Organization	Public Agency
Contact Person	Mr. Clarence J. Mayott 1234 East Shaw Avenue Fresno, California 93710 (209) 243 4005 ext. 171
Collaborators	Tuolumne River Technical Advisory Committee (McBain and Trush Inc. Consultants)
Type Project	Construction

III. Project Description

Project Description and Approach

The purpose of the project is to begin the restoration of a coarse sediment supply to the Tuolumne River below La Grange Dam by introducing clean gravels into the river between the La Grange Dam and Basso Bridge (Figures 1 and 2). These gravels would be slightly smaller than the gravels on the currently paved bed surface, so that the contemporary flow regime or scheduled event can slowly transport these gravels downstream in order to maintain salmonid habitat over time. This project assumes gravel movement will occur. The gravels would be mobilized, deposited as bars and spawning habitat, and redeposited over time. Slowly routing these gravels downstream will functionally provide a long project life span. All the gravel placed during the project would be moved downstream by the flow of the Tuolumne River, mimicking the natural process of course sediment loading and transport. Increased and improved chinook salmon spawning habitat would be expected.

The project would be divided into two phases: Phase 1 would introduce approximately 10,000 cubic yards of clean spawning gravel into the Tuolumne River upstream of the New La Grange Bridge (J-59), and Phase 2 would add approximately 10,000 cubic yards between the Basso Bridge and New La Grange bridge. Phase 1 would be conducted in the summer of 1998, and would utilize sources of gravel nearby the proposed introduction site. Phase 2 would be conducted in the summer of 1999, and would utilize screened dredger tailings obtained from downstream sources. Both phases would introduce the gravel by creating natural bar features, including point bars, pool tailouts, and riffle crests. The amount and placement of these gravels would be determined by the physical and hydrological conditions specific to each site. This method is not only low-impact, but it should also provide alluvial features in a natural morphology that can be immediately used by salmonids.

After completion of Phase 1 and 2, a continued, maintenance program would be developed to annually replenish gravel transported out of the area by existing flows.

Geographical Location And Description

This project is located in the Tuolumne River watershed, on the lower Tuolumne River, near the town of La Grange in Stanislaus County (Figure 1). The project site is approximately 30 miles east of Modesto on Highway 132. The Tuolumne River has several dams operated by the City and County of San Francisco (CCSF) in the upper watershed, and two dams operated by the Turlock and Modesto Irrigation districts downstream of the CCSF projects. The lowest dam in this watershed is La Grange Dam, located at river mile 52.1. Built in 1893, La Grange Dam blocked or severely limited upstream salmonid migration and gravel recruitment from the upper watershed since its

construction. Phase 1 gravel introductions would occur closer to the dam, upstream of the New La Grange Bridge from river mile 49.9 to 51.5. Phase 2 gravel introduction would occur upstream of the Basso Bridge from river mile 47.5 to 49.9 (Figure 2). We may add more gravel to the Phase 1 reach in Phase 2 if appropriate.

Expected Benefits

Gravel would be added to the Tuolumne River in a reach heavily used as spawning and rearing habitat by fall-run chinook salmon. In the short term, the addition of 20,000 cubic yards of gravel should increase the quantity and quality of salmon spawning and rearing habitat in this reach. Improved spawning productivity should occur. In addition, the increase in gravel supply would produce significant alluvial deposits, which should benefit other inhabitants of the riverine ecosystem including aquatic invertebrates, amphibians and other native fish species.

In the long-term, these gravels would slowly move through the river system during mainstem high flows, redepositing in downstream habitats to be used again and again. Restoring the long-term bedload supply would encourage point bars and in-channel bar features to form, increasing channel and habitat complexity. Continued introductions of gravels at a rate equal to that of mainstem transport would restore the coarse sediment balance and maintain instream storage of these gravels. Improved salmon spawning productivity would continue.

Background and Biological/Technical Justification

Increased water usage, linked to population growth, agricultural production and gravel mining have caused severe reduction in the riparian habitat of the San Joaquin Valley. The damming of San Joaquin River tributaries and controlled water releases have changed riparian ecology. San Joaquin Basin chinook salmon populations have declined to seriously low levels in recent years. Drought, inadequate stream flows, water storage and power development, habitat deterioration and Delta water exports have had varying degrees of impact.

Construction of La Grange Dam in 1893 at river mile 52 permanently ended coarse sediment supply (gravels/cobbles) from the Tuolumne River watershed upstream of the town of La Grange. Because the few tributaries entering the Tuolumne River downstream of La Grange contribute virtually no coarse sediment, sediment transported during high flows has been obtained from the bed itself and limited floodplain deposits (bank erosion of dredger tailings). In the absence of an upstream source, high flow events selectively transport the gravels from the bed surface, leaving large cobbles that armored the bed surface. Further reduction in flood event magnitude, duration, and frequency after completion of New Don Pedro Dam in 1969 functionally eliminated channel migration and recruitment of floodplain gravel deposits.

Gravels and cobbles form the bed and banks of the river. These structures also create the habitat used by salmonids and other species inhabiting the Tuolumne River corridor. Elimination of upstream supply has helped cause channel incision in some locations, and bed particle coarsening in the spawning reach near La Grange. Not only has this condition degraded salmonid habitat, it has also reduced the volume and extent of gravel storage in the Tuolumne River.

The coarse sediment supply critical for salmonid habitat has been eliminated, and the fine sediment supply that is damaging to salmonid habitat has increased relative to mainstem flows. This, combined with various other stressors, has helped reduce anadromous salmonid productivity. The proposed project would distribute a large volume of gravel in the upper 4 miles of anadromous salmonid habitat on the Tuolumne River. Future phases of this project would maintain this instream storage with yearly gravel introduction at a rate equal to downstream transport. This approach would mimick how the river use to function prior to flow and sediment regulation. The project would provide a long-term gravel source so that the river would be dynamic (transports gravel) but with a roughly constant instream storage (equilibrium).

Proposed Scope of Work

Phase 1: Approximately 10,000 cubic yards of clean, gravels would be added to the Tuolumne River upstream of the new La Grange Bridge. The project would be completed in the summer of 1998. Monitoring would continue through 1999 with the first monitoring report due in June 1999. Evaluation of this pilot phase would be incorporated into Phase 2.

Phase 2: Approximately 10,000 cubic yards of clean, gravels would be added to the Tuolumne River upstream of the Basso Bridge to the new La Grange Bridge. The project would be completed in the summer of 1999. Monitoring would continue through 2000 with the second monitoring report due in June 2001. Once completed, recommendations regarding continued, annual gravel addition would be provided for consideration.

Monitoring and Evaluation

The two objectives of this project would be to reestablish substantial instream storage of spawning sized gravels, and to maintain this storage by adding gravels into the river at a rate roughly equal to instream transport during high flow events. Monitoring and data evaluation would determine and evaluate whether these objectives were being satisfied by the proposed activities. For example, if the monitoring plan documents that instream storage decreases, then the yearly gravel introduction volume would need to be increased accordingly.

Four physical monitoring techniques would be used: cross section surveys, tracer gravels, scour cores, and bedload transport sampling. Cross sections would be placed through the alluvial features created at the introduction sites, and would document changes in

morphology (overall gain or loss of gravel storage) at each introduction site. Spatial differences in morphological adjustment would be evaluated by comparing trends in cross sections in the downstream direction (e.g., are upstream reaches degrading and downstream reaches aggrading with gravel). Cross sections would be the primary technique to evaluate changes in gravel storage year to year. Tracer gravels (painted gravels) would be placed in gravel introduction deposits to document bed mobility thresholds and travel distance during high flow events. Scour cores would be placed in gravel introduction deposits to document the depth of gravel scour and redeposition during high flow events (gravel flushing). Bedload transport sampling would be conducted from the Old Basso Bridge (river mile 47.5). It would estimate gravel transport as a function of discharge and would be used to help quantify how much gravel should be introduced on a yearly basis. Bedload sampling would be an opportunistic venture, with sampling only occurring when mainstem flows were greater than the threshold for bed movement (>5,000 cfs). This sampling would target a wide variety of flows larger than the threshold. An appropriate bedload transport function would be fit to the data to extrapolate to the full range of discharges observed on the Tuolumne River.

Biological monitoring of the annual fall-run chinook salmon escapement is currently the responsibility of DFG's Region 4 personnel. DFG is required under FERC License 2299 to annually estimate and monitor the adult chinook salmon escapement in the Tuolumne River. Data currently gathered includes a mark/recapture study to estimate population size, fork lengths, sex, scale and otolith samples to age fish, hatchery contribution, the number of redds per each riffle, and timing and location. These escapement surveys will continue and this data would be utilized to evaluate the biological changes associated with the gravel introductions. Redd mapping of the affected gravel bars (riffles) would also be conducted to help evaluate the biological impacts.

Implementability

Support for this acquisition comes from the San Joaquin River Management Program participants, environmental groups, sport and commercial salmon fishers, the Tuolumne River Technical Advisory Committee and the numerous agencies involved in restoring riparian, wetland and aquatic habitats throughout the state.

Material for Phase 1 of the project are available nearby. Cursory discussions with the owners of this material indicate a complete willingness to supply the necessary materials. DFG already has access (at no cost) to approximately 1,500-2,500 cubic yards of material that would be used for Phase 1. Transportation and placement of the material would be completed by DFG employees.

Material for Phase 2 is available less then 10 miles from the proposed introduction sites. Cursory discussions with the owners of this material indicate a complete willingness to

supply the necessary materials. Transportation and placement would be completed by DFG and contracted personnel.

The land adjacent to the gravel introduction sites is owned mostly by Stanislaus County although a few privately owned parcels exist north of the river. Access would be from county owned land and would pose no problem; unimproved "roads" already exist. Long term plans for the property adjacent to the river include a "river parkway" and recreational area which would insure long term access. Permitting for both phases would be completed by DFG employees. A Negative Declaration is the appropriate documentation.

In summation, this project is relatively easy to implement. Administrative and regulatory documentation is limited and logistical elements pose no problems.

Figure 1. Project Area for Gravel Addition LaGrange Site, Tuolumne River

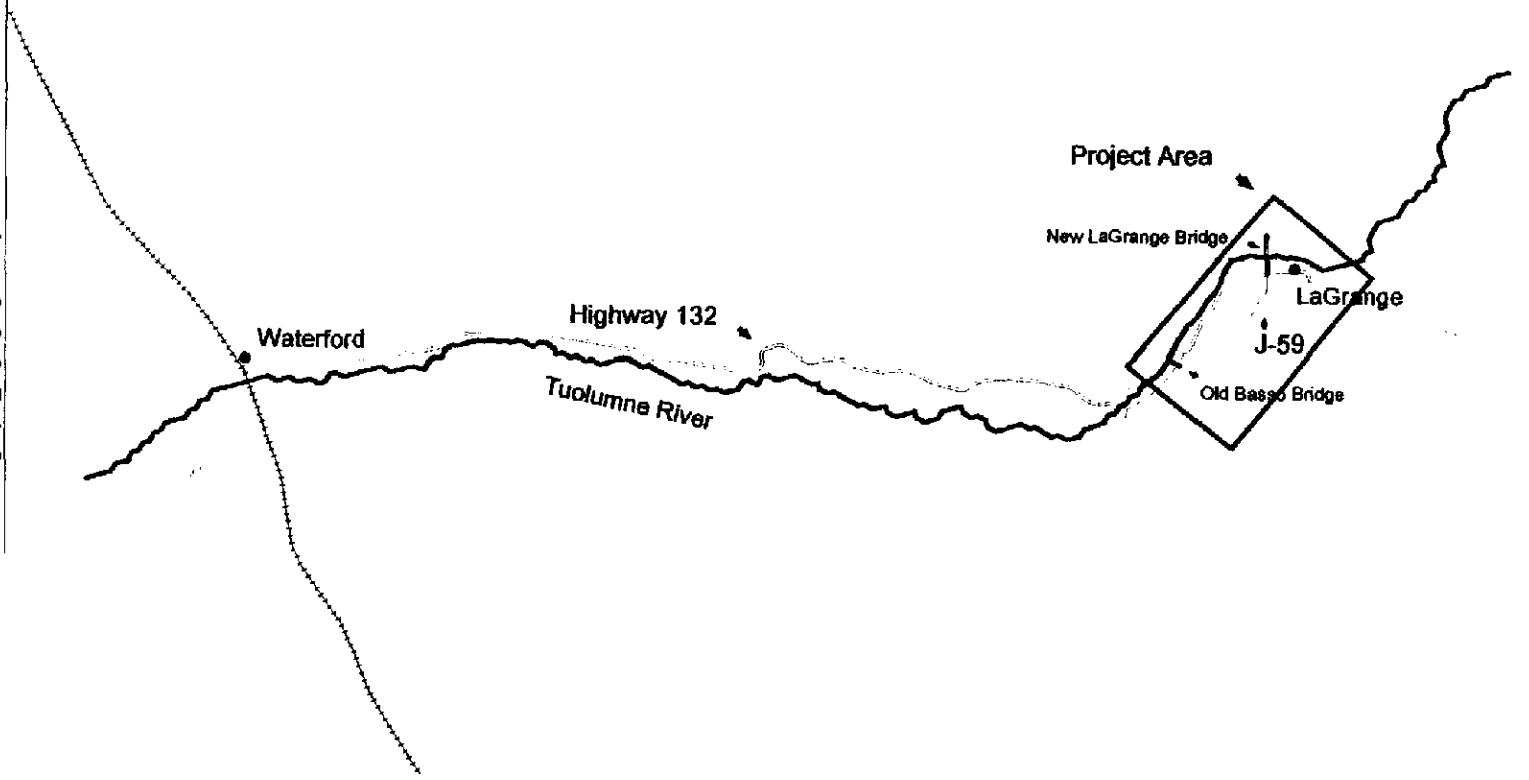

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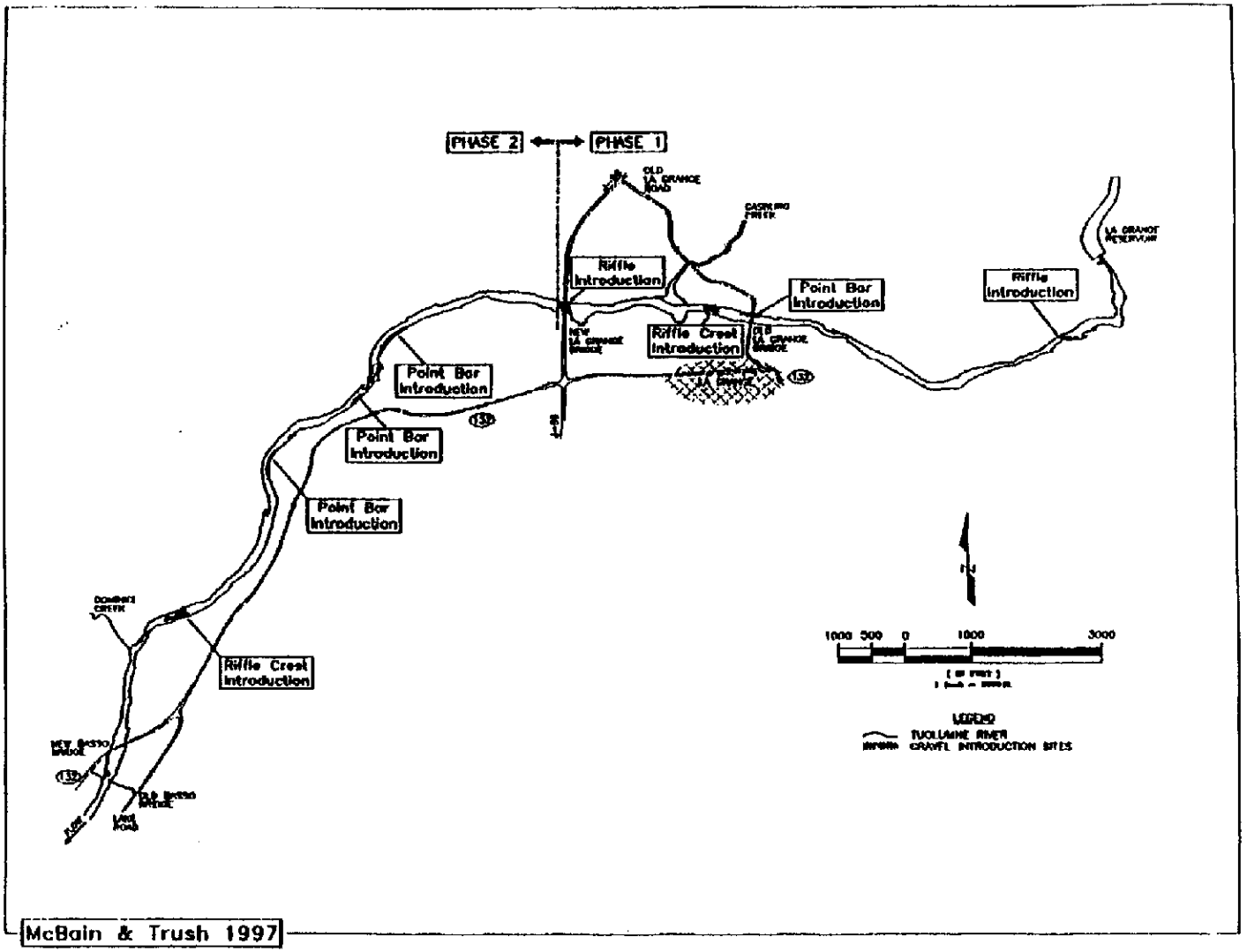
Figure 2. Proposed Spawning Gravel Introduction Sites, Tuolumne River



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V. Cost and Schedule to Implement Proposed Project

Budget Costs

The following costs are associated with this project.

	Direct Labor Hours	Direct Salary Benefits	Administration @ 25%	Service Contract	Acquisition	Miscellaneous	TOTAL
Monitoring Phase 1&2	80 AFB	2,675*	8,750	35,000			43,750
Permits Phase 1&2	160 AFB 160 OA 2	5,350* 3,192*	750		Permit Fees 3,000		3,750
Construction Phase 1	160 HS 160 F&W Asst. 2 160 Temp.	4,175* 3,081* 1,600	40,375		10,000 yd. processed material 141,500	Tractor Rental 20,000	203,475
Construction Phase 2	80 HS 80 F&W Asst. 2 160 Temp.	2,087* 1,540* 1,600	40,375		10,000 yd. processed material 141,500	Tractor Rental 20,000	203,475
TOTAL		22,100* 3,200	90,250	35,000	286,000	40,000	454,450
Contingency						50,000	504,450

AFB - Associate Fishery Biologist
OF 2- Office Assistant
HS- Habitat Specialist
* in-kind: not added into total

The majority of project costs will be for the purchase, processing, and transporting of materials. The DFG has approximately 2,100 cu. yd. of material available at no cost for this project. Phase 2 introduction would utilize screened gravels (dredger tailings) from nearby sources.

The budget proposed is estimated based on best available information at this time. Costs may vary when actual work begins or contracts are developed. Phase 1 cost may be reduced substantially because of material available to DFG at no cost. There are no O&M

costs associated with this project. Cost sharing of $22,100 is available as DFG in-kind services.

Scheduling Milestones and Incremental Funding
Scheduling milestones and incremental funding from CALFED is suggested as follows.

First Incremental Payment: Payment for monitoring, permitting and construction of Phase 1 would total $250,975 and would be requested upon approval of the funding .

Second Incremental Payment: Payment for construction of Phase 2 would total $203,475 and would be requested after construction of Phase 1.

Third Party Impacts
No third party impacts are expected. Cursory discussions with Stanislaus County Planning Department and Parks Department suggest no problems with the proposed land use. Land owner adjacent to the project should not be affected.

V. Applicants Qualifications

DFG's Region 4 anadromous fishery staff administered $1.5 million in the 1995-96 fiscal year. In 1995-96 they helped develop 21 habitat restoration projects and completed the environmental documentation for 5 of these projects. The staff have been named contract managers for several restoration, revegetation, fish screening and fish research projects. Region 4 staff has work closely with the various other state, federal and private personnel, to construct chinook salmon spawning, rearing and predator pond isolation project in the San Joaquin River basin. These projects include.

Merced River Riffle Reconstruction Project 1991: A riffle reconstruction project.

M. J. Ruddy Project 1992: A river restoration project. Site revegetation was also completed.

Tuolumne River Riffle Reconstruction Project 1993: A riffle reconstruction project. Site revegetation was also completed.

Stanislaus River Riffle Reconstruction Project 1995: A riffle reconstruction project. Site revegetation was also completed.

Magneson Pond Predator Isolation Project 1996: A pond isolation project. Site revegetation was also completed.

Merced River Gravel Addition Project 1996: A riffle spawning gravel addition project.

Reed Pond Predator Isolation Project 1997: A pond isolation and floodplain reconstruction project. Site revegetation is also included.

Stanislaus River Gravel Addition Project Goodwin Canyon 1997: A spawning gravel addition project.

Hills Ferry Fish Barrier 1992-2009: A multi year, fish barrier project.

The DFG Region 4 staff assigned to implement the Spawning Gravel Introduction, Tuolumne River Project are:

Mr. Bill Loudermilk, Senior Fisheries Biologist (M/F). Mr. Loudermilk will supervise the overall project at no cost.

Mr. Clarence J. Mayott, Associate Fisheries Biologist (M/F). Mr. Mayott will assist in these responsibilities. He will obtain all necessary permits. He will also develop the contracts necessary to purchase, process and transport the necessary material. He will develop the contract with private consultants to monitor the project. He will be assisted by a seasonal scientific aide.

Mr. Thomas Rogers Fish Habitat Specialist. Mr. Rogers will be responsible to construct the project. He will be assisted by a permanent Fish and Wildlife Assistant (Mr. John Lokke) and several seasonal personnel.

This core staff will obtain administrative support from both Region 4 and Inland Fisheries Division's (IFD) clerical, fiscal and contractual personnel. Region 4's environmental and wildlife personnel will provide technical and scientific review when necessary.

Dr. William Trush and Scott McBain helped develop the technical details of this proposal. Dr. William Trush is a river ecologist specializing in ecosystem ecology, fish biology, and fluvial geomorphology, and Scott McBain is a hydraulic engineer specializing in fluvial geomorphology, streamflow hydrology, and channel design. McBain and Trush are consultants for the Tuolumne River Technical Advisory Committee.

VI. Compliance with Standard Terms

DFG is a public agency and will comply with appropriate terms and conditions pursuant to policy, regulation and law.